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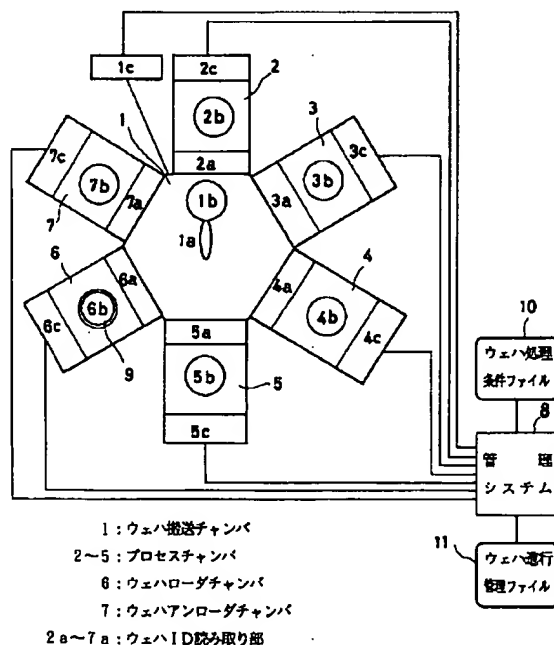
(54)【発明の名称】 ウェハID読み取り機能付きマルチチャンバ装置

(57)【要約】

【目的】 被処理ウェハの処理条件の設定および進行状況の管理を自動的に行うことができるウェハID読み取り機能付きマルチチャンバ装置を提供する。

【構成】 複数のプロセスチャンバ内に順にウェハを挿入してプロセス処理を一貫して行う半導体製造工程に用いられ、ドッキングチャンバを有しないマルチチャンバ装置とされ、ウェハ搬送チャンバ1に、4台のプロセスチャンバ2～5、ウェハローダチャンバ6およびウェハアンローダチャンバ7が接続され、これらは管理システム8により制御される構成となっている。そして、プロセスチャンバ2～5、ウェハローダチャンバ6およびウェハアンローダチャンバ7には、それぞれウェハ9のウェハIDを読み取るウェハID読み取り部2a～7aなどが備えられ、ウェハ9上の特定位置に刻印されたウェハIDがウェハ9の搬入時と搬出時に光学的に読み取られるようになっている。

図 1



# PATENT ABSTRACTS OF JAPAN

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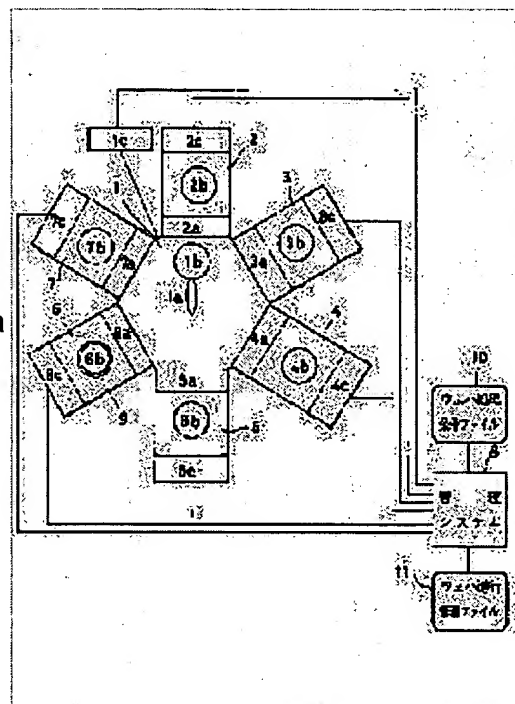
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## (54) MULTIPLE-CHAMBER APPARATUS HAVING WAFER-ID READING FUNCTION

### (57)Abstract:

**PURPOSE:** To provide a multiple-chamber apparatus having the wafer-ID reading function, which can automatically control the setting of the processing conditions of wafers to be processed and the progressing state.

**CONSTITUTION:** This apparatus is used in the semiconductor manufacturing process, wherein wafers are sequentially inserted into a plurality of process chambers and the processing is performed in the integrated pattern. The multiple-chamber apparatus does not have a docking chamber.. Four process chambers 2-5, a wafer loader chamber 6 and a wafer unloader chamber 7 are connected to a wafer conveying chamber 1. These chambers are controlled with a control system 8. Wafer-ID reading parts 2a-7a and the like, which read the wafer ID of a wafer 9, respectively, are provided in the process chambers 2-5, the wafer loader chamber 6 and the wafer unloader chamber 7. The wafer ID, which is marked at the specified position on the wafer 9, is optically read when the wafer 9 is conveyed in and out.



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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] When a multiple-processes chamber, a wafer loader chamber, and a wafer unloader chamber are connected especially to a wafer conveyance chamber about the multi chamber used for a semi-conductor production process, this invention is applied to the multi chamber with a wafer ID (Identification: identification code) reading function setting out of the processing conditions of a processed wafer and whose automation of management of a progress situation are enabled, and relates to an effective technique.

[0002]

[Description of the Prior Art] In recent years, it combines with progress of high integration of LSI, and detailed-izing of a device, the technique from a new viewpoint is required also of semiconductor fabrication machines and equipment, and the multi chamber covering two or more processes is also one of them. This multi chamber is proposed and manufactured by the semiconductor device manufacturer in and outside the country from the second half of the 1980s by the reason shown below as one of the development gestalten of future semiconductor fabrication machines and equipment.

[0003] (1) Since . multi chamber system can perform consistent processing of the wafer in a vacuum or an inert gas ambient atmosphere, when forming each class, it can prevent the contamination from the external world etc., it can plan upgrading, and can also attain stabilization of quality further.

[0004] (2) Since it is consistent processing within . multi chamber system, the cutback of the time amount which wafer conveyance takes can be performed, and process compaction as the whole can be aimed at.

[0005] (3) In . multi chamber, since it corresponds to a new process, and only one process chamber which constitutes the multi chamber is manufactured newly and the wafer carrier-robot section, a load lock chamber, etc. can use the conventional thing as it is, the equipment costs for semi-conductor manufacture are reducible.

[0006] Next, if the outline of a multi chamber is explained, the multi chamber manufactured so far, for example will connect a multiple-processes processor to a wafer transport device, and will aim at consistent processing of a part of process processings.

[0007] And the basic configuration of a multi chamber is the process chamber and load lock chamber which were connected with the wafer conveyance chamber used as a base around it, and by using such a multi chamber, if it is for example, thin film formation, it can perform consecutive processing which cohered from the pretreatment to the thin film depository.

[0008]

[Problem(s) to be Solved by the Invention] However, there are the following problems in the above conventional techniques.

[0009] (1) It is necessary to input processing conditions to a process processor, and when performing process processing, in . semi-conductor manufacture, in the present multi chamber, an operator needs to check ID of a processed wafer and needs to input processing conditions into equipment. That is, in the conventional multi chamber, although conveyance of a wafer is automated, it does not automate about the condition input in process processing, therefore the useless time amount of the waiting for a processing condition occurs.

[0010] (2) An input mistake may occur in the equipment condition input by . help. Therefore, the cure for preventing an input mistake is required.

[0011] (3) When an operator inputs processing conditions by . multi chamber, it is necessary to record this content after processing termination so that the next activity may be done correctly.) However, the record activity by the help tends to produce a mistake, and possibility that a processed wafer will not be correctly processed at the following process for

the record mistake produces it.

[0012] (4) When two or more set number connection of the multi chamber is made by the docking chamber, generally it is difficult for an operator to check the processing conditions of two or more processed wafers, and to input the corresponding conditions correctly.

[0013] As mentioned above, in the conventional multi chamber, there is a problem that it is inapplicable good to the problem of the setting-out input in the processing conditions of a processed wafer, the demand to automation, etc.

[0014] Then, the object of this invention is to offer the multi chamber with a wafer ID reading function which can perform automatically setting out of the processing conditions of a processed wafer, and management of a progress situation by the wafer ID reading function.

[0015] The other objects and the new description will become clear from description and the accompanying drawing of this description along [ said ] this invention.

[0016]

[Means for Solving the Problem] It will be as follows if the outline of a typical thing is briefly explained among invention indicated in this application.

[0017] That is, a multiple-processes chamber, a wafer loader chamber, and a wafer unloader chamber are connected to a wafer conveyance chamber, and the multi chamber with a wafer ID reading function of this invention inserts a wafer in order into these multiple-processes chambers, is a multi chamber used for the semi-conductor production process which is consistent and performs process processing, and prepares the wafer ID reading section in a multiple-processes chamber, a wafer loader chamber, and a wafer unloader chamber.

[0018] In this case, a multiple-processes chamber, a wafer loader chamber, and a wafer unloader chamber prepare said wafer ID reading section in the wafer conveyance chamber side with which it connects.

[0019] Moreover, said wafer ID reading section is arranged in the upper part of the conveyance path of a wafer, the wafer ID on a wafer is read optically, this reading information is collated with the content of the wafer processing information file, and it is made to transmit the content of a process which each of a process chamber should perform to a process chamber.

[0020] Furthermore, the wafer processing conditions saved at said wafer processing information file are grasped with Wafer ID, and the progress situation and the content of processing of the wafer are searched with Wafer ID.

[0021] Furthermore, the content of the progress situation of the wafer of said wafer processing information file is updated with Wafer ID.

[0022]

[Function] According to the above mentioned multi chamber with a wafer ID reading function, by being prepared in a multiple-processes chamber, wafer loader chamber and wafer unloader chamber, or wafer conveyance chamber side, the wafer ID reading section can set up the processing conditions in each process chamber from the wafer ID read by the wafer ID reading section, and can update the progress situation of this wafer after processing.

[0023] For example, you make it the system of a high order which has the file which has the processing conditions of a processed wafer, and the file which manages the progress situation of a wafer as a wafer processing information file interlocked with, and it becomes possible with the algorithm which performs automatically setting out of processing conditions, and renewal of a progress situation.

[0024] That is, in each process chamber of a multi chamber, when a wafer is conveyed from a wafer conveyance chamber to a process chamber, after reading the wafer ID, collecting processing conditions from the system of a high order using the read wafer ID, and deciding process processing conditions automatically and processing a wafer, the normal termination information can be returned to the system of a high order, and the progress situation of a wafer can be updated automatically.

[0025] When the processing conditions of a processed wafer can be set up automatically, management of the progress situation of a wafer is also further automatable by this and the top wafer is sent to the process chamber of the next processing, activation of the normal processing by the down stream processing can be enabled.

[0026]

[Example] The outline block diagram showing the multi chamber with a wafer ID reading function whose drawing 1 is one example of this invention, the sectional view where drawing 2 shows the wafer ID reading section of the multi chamber with a wafer ID reading function of this example to a detail, and drawing 3 are flow drawings showing the procedure in this example.

[0027] First, drawing 1 explains the configuration of the multi chamber with a wafer ID reading function of this example.

[0028] The multi chamber with a wafer ID reading function of this example inserts a wafer in order for example, into a

multiple-processes chamber, is used for the semi-conductor production process which is consistent and performs process processing, and is made into the multi chamber which does not have a docking chamber, four sets of the process chambers 2-5, the wafer loader chamber 6, and the wafer unloader chamber 7 are connected to the wafer conveyance chamber 1, and these have composition controlled by the managerial system 8.

[0029] The wafer conveyance chamber 1 is crooked, for example in joint. Elastic arm 1a for wafer conveyance, It has sample base 1b for wafer conveyance which carries a wafer 9, and actuation control-section 1c which drives arm 1a for wafer conveyance. The wafer 9 which sample base 1b for wafer conveyance was fixed at the head of arm 1a for wafer conveyance, and was carried in this sample base 1b for wafer conveyance It is based on control of actuation control-section 1c, and is carried in/taken out between the process chambers 2-5, the wafer loader chamber 6, and the wafer unloader chamber 7.

[0030] The process chambers 2-5 are equipped with the actuation control sections 2c-5c which drive the wafer ID reading sections 2a-5a which read the wafer ID of a wafer 9, respectively, sample base 2b for wafers - 5b which carries a wafer 9, and sample base 2b for wafers - 5b, and process processing of the wafer 9 carried in sample base 2b for wafers - 5b is carried out based on control of the actuation control sections 2c-5c. For example, if it is thin film formation, each processing of the consecutive processing which cohered from the pretreatment to the thin film depository will be performed in each process chamber 2-5.

[0031] Moreover, wafer ID reading section 2a (3a-5a) As shown in drawing 2 , it is arranged in the upper part of the conveyance path of the wafer 9 in the process chamber 2 (3-5) near the connection with the wafer conveyance chamber 1. Wafer ID9a stamped on the specific location on a wafer by this wafer ID reading section 2a (3a-5a) is optically read at the time of carrying in of a wafer 9 and taking out.

[0032] Wafer ID reading section 6a which the wafer loader chamber 6 is arranged in the upper part of the conveyance path of the wafer 9 in the wafer loader chamber 6 like the process chambers 2-5, and reads wafer ID9a at the time of carrying in of a wafer 9 and taking out, It has sample base 6b for wafers which carries a wafer 9, and actuation control-section 6c which drives sample base 6b for wafers, and the wafer 9 conveyed from the outside is carried in in a multi chamber through the wafer loader chamber 6.

[0033] The wafer unloader chamber 7 like the process chambers 2-5 Wafer ID reading section 7a which is arranged in the upper part of the conveyance path of the wafer 9 in the wafer unloader chamber 7, and reads wafer ID9a at the time of carrying in of a wafer 9 and taking out, It has sample base 7b for wafers which carries a wafer 9, and actuation control-section 7c which drives sample base 7b for wafers, and the wafer 9 by which consistent processing was carried out within the multi chamber is taken out outside through the wafer unloader chamber 7.

[0034] A managerial system 8 contains the data-processing system of the wafer conveyance chamber 1, the process chambers 2-5, the wafer loader chamber 6, and the wafer unloader chamber 7 other than the overall control function of a multi chamber, and these overall control is automatically performed according to the algorithm programmed beforehand.

[0035] Moreover, the wafer processing condition file 10 as a wafer processing information file and the wafer progress management file 11 are connected to a managerial system 8, and the processing conditions of the wafer 9 in each process chambers 2-5 are collected from the wafer processing condition file 10, and it is decided automatically, and the content of the progress situation of the wafer progress management file 11 is automatically updated by the normal-termination information after processing of a wafer 9.

[0036] In addition, in the above configurations, it is possible with the present technique to read wafer ID9a optically, and it is easily possible to transmit and receive wafer processing information by intersystem communications further, to include the algorithm which identifies a specific process according to a progress situation, etc.

[0037] Next, the case where automatic processing of a wafer 9 is performed actually is explained about an operation of this example based on the processing flow of drawing 3 . In drawing 3 , it means that processing of each column of the direction of a train is performed with each component of a publication in the upper part.

[0038] Introduction and the wafer 9 which should be processed shall be installed in sample base 6b for wafers in the wafer loader chamber 6.

[0039] First, if an operator operates pushing an initiation switch (not shown) etc., a managerial system 8 will emit an initiation instruction (step 301). Then, the directions for which arm 1a for wafer conveyance in the wafer conveyance chamber 1 is moved to the wafer loader chamber 6 come out from a managerial system 8. This is migration to the wafer loader chamber 6 in the column of the wafer conveyance chamber 1 (step 302).

[0040] Furthermore, according to the wafer conveyance directions from a managerial system 8, actuation control-section 1c of the wafer conveyance chamber 1 inserts arm 1a for wafer conveyance in the wafer loader chamber 6, puts the wafer 9 for processed currently installed on sample base 6b for wafers on sample base 1b for wafer conveyance of

arm 1a for wafer conveyance, and pulls out arm 1a for wafer conveyance in the wafer conveyance chamber 1.

[0041] In the middle of the activity which pulls out this wafer 9, a wafer 9 passes wafer ID reading section 6a of the wafer loader chamber 6. At this time, wafer ID reading section 6a can read wafer ID9a stamped on the specific location of a wafer 9. This is reading of wafer ID9a in the column of the wafer loader chamber 6 (step 303).

[0042] And read wafer ID9a is sent to a managerial system 8 from wafer ID reading section 6a, checks wafer ID9a with the wafer progress management file 11 under control of a managerial system 8, and checks the content of degree process. This is the progress check in the column of the wafer loader chamber 6 (step 304).

[0043] Acquiring this information, a managerial system 8 executes the selection instruction of one of the process chambers 2-5 (step 305). That is, the carrier beam wafer conveyance chamber 1 moves an instruction to the specific process chamber 2 to which arm 1a for wafer conveyance was directed, for example, a process chamber, from a managerial system 8. This is migration to the specific process chamber 2 (step 306).

[0044] In addition, it can be made to move to other process chambers 3-5 similarly, and generality is not lost by this. By the above processing, a wafer 9 will be in the condition of standing by at the entry of the process chamber 2.

[0045] Then, a managerial system 8 emits the insertion instruction of the wafer 9 of the column of a managerial system 8 (step 307). Consequently, actuation control-section 1c of the wafer conveyance chamber 1 carries in a wafer 9 to the process chamber 2 in the condition of having been put on sample base 1b for wafer conveyance.

[0046] While this wafer 9 being carried in to the process chamber 2, a wafer 9 passes wafer ID reading section 2a. At this time, wafer ID reading section 2a performs reading of wafer ID9a (step 308). This is equivalent to ID reading of step 303.

[0047] And a managerial system 8 checks that this process chamber 2 is right selection with reference to the content of the wafer progress management file 11 under management of a managerial system 8 based on wafer ID9a which wafer ID reading section 2a read.

[0048] Furthermore, reading of the processing conditions of a wafer 9 is performed (step 309). That is, the processing conditions equivalent to this process are chosen from the wafer processing condition file 10 under control of a managerial system 8. By this, process processing can be performed automatically. This is process processing in the process chamber 2 (step 310).

[0049] A managerial system 8 emits the ejection instruction of a wafer 9 after process processing (step 311). With this instruction, migration to the specific process chamber 2 in the column of the wafer conveyance chamber 1 is performed (step 312).

[0050] And with directions of a managerial system 8, actuation control-section 1c of the wafer conveyance chamber 1 moves arm 1a for wafer conveyance to the process chamber 2, and takes out the wafer 9 in the process chamber 2. When pulling out a wafer 9 from the process chamber 2, reading of wafer ID9a in the column of the process chamber 2 is performed (step 313).

[0051] It judges whether the following process can be processed at the same time it updates that this processing was completed in the progress situation in the wafer progress management file 11 with reference to the wafer progress management file 11 which is under wafer ID9a obtained through the managerial system 8, and control of a managerial system 8 at this time. This is the termination judging in the column of a managerial system 8 (step 314).

[0052] Furthermore, when processing can be continued by the process chambers 3-5 of a multi chamber, it progresses to the progress check of step 304, and the same processing as the following is performed. Moreover, when processing is impossible in the process chambers 3-5, processing by this multi chamber is completed, and a managerial system 8 emits a completion instruction (step 315).

[0053] And if a completion instruction is \*\*\*\*(ed), a managerial system 8 will be changed into the condition that a wafer 9 is installed in the wafer unloader chamber 7, and it can take out outside, will make an initial state arm 1a for wafer conveyance, and will do an activity into a stop condition.

[0054] A wafer 9 is carried in from the wafer loader chamber 6 as mentioned above, consistent processing is further carried out through each process chambers 2-5, and, finally it is taken out outside through the wafer unloader chamber 7.

[0055] Therefore, according to the multi chamber with a wafer ID reading function of this example By forming the wafer ID reading sections 2a-7a in the process chambers 2-5, the wafer loader chamber 6, and the wafer unloader chamber 7 When a wafer 9 is pulled out in the wafer conveyance chamber 1 from the process chambers 2-5 of a before process, wafer ID9a is read. When a wafer 9 is inserted in the process chambers 2-5 which chose the process chambers 2-5 corresponding to processing of degree process, and were chosen further, after reading wafer ID9a again and checking the justification of selection, processing can be performed automatically.

[0056] Moreover, while after activation of processing chooses the process chambers 2-5 corresponding to processing of

degree process, it can update the progress situation of the ended processing automatically.

[0057] Furthermore, since wafer ID9a can be similarly read when are carried in to the wafer conveyance chamber 1 from the wafer loader chamber 6, and taken out by the wafer unloader chamber 7 from the wafer conveyance chamber 1, it can respond to automation of the consistent process processing in a multi chamber.

[0058] As mentioned above, although invention made by this invention person was concretely explained based on the example, it cannot be overemphasized that it can change variously in the range which this invention is not limited to said example and does not deviate from the summary.

[0059] For example, although the case where the wafer ID reading sections 2a-7a were formed in the process chamber 2-5, wafer loader chamber 6, and wafer unloader chamber 7 side about the multi chamber with a wafer ID reading function of this example was explained, this invention is not limited to said example and can be applied about the case where the wafer ID reading section is prepared in a wafer conveyance chamber side.

[0060] Furthermore, in said example, although reading of wafer ID9a is carried [ both ] out when taking out a wafer 9 from the process chambers 2-5 when a wafer 9 is carried in to the process chambers 2-5 and, it is also possible to read Wafer ID in either carrying in or taking out.

[0061] Moreover, when the process chamber of many less than [ this ] or beyond this is connected to compensate for process processing of a semi-conductor production process etc. about the configuration of the wafer conveyance chamber 1, and the quantity of the process chambers 2-5, it cannot be overemphasized that it can apply to various connection configurations, such as a configuration which has a docking chamber further.

[0062]

[Effect of the Invention] It will be as follows if the effectiveness acquired by the typical thing among invention indicated in this application is explained briefly.

[0063] (1) Since Wafer ID can be automatically read by the wafer ID reading section by preparing the wafer ID reading section in . multiple-processes chamber, a wafer loader chamber, and a wafer unloader chamber For example, it becomes possible to be able to search with Wafer ID the progress situation and the content of processing of the wafer saved at the wafer processing information file, and to be able to set up the processing conditions in each process chamber, and to update the progress situation of this wafer after processing.

[0064] (2) By preparing the . wafer ID reading section in a wafer conveyance chamber side, it is the above (1). While setting out of processing conditions and renewal of a progress situation can be performed automatically similarly, it becomes possible to divert the conventional process chamber.

[0065] (3) . above (1) And (2) Since the processing conditions of a processed wafer can be set up automatically, problems, such as a setting-out input mistake in the processing conditions of the processed wafer by help like before, are solved, and the multi chamber whose activation of the normal processing by down stream processing corresponding to progress of high integration of LSI and detailed-izing of a device is enabled can be obtained.

[0066] (4) . above (1) And (2) Since management of a progress situation can also be performed automatically in addition to setting out of processing conditions, the process processing which automatic-carried in the wafer and continued, and the multi chamber whose implementation of the basic form voice of the automatic consistent processing to automatic taking out of a wafer is still enabled can be obtained.

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[Translation done.]